



BACTERIAL WILT AND DECLINE OF TURFGRASSES

Bacterial wilt and decline is caused by the bacterium *Xanthomonas* pv. *graminis*. The disease affects Toronto (C-15), Seaside, Nemisilla, and possible other creeping bentgrasses, as well as annual bluegrass. Bacterial wilt and decline occurs from late spring through summer and early fall during warm, sunny weather. Infection and disease development is favored by closely mowed turf and warm, sunny days with cool-to-warm nights and heavy rainfall or watering.



Figure 1. Toronto creeping bentgrass golf green heavily infected with bacterial wilt and decline. Note the uneven mottled appearance.

The disease has been reported throughout Illinois and in many areas of the United States where creeping bentgrass, especially Toronto, is cultivated on golf greens. An antiserum recently prepared against an Illinois isolate of the bacterium interacted with isolates from Ohio, Michigan, and Wisconsin and with several *X. campestris* pv. *graminis* isolates known to cause wilting and decline of turf and forage grasses in Europe. This suggests that the bacterium came to the United States from Europe.

Studies of forage grasses in Europe and New Zealand indicate host grasses of the bacterium include perennial and annual (Italian) ryegrasses, bluegrasses, tall and meadow fescues, orchardgrass, timothy, quackgrass, and possibly others. Preliminary evidence in the United States indicates that the bacterium may be adapting itself to other grasses, such as bluegrasses.

Symptoms

The leaves on individual plants start to wilt from the tip down. Within a few days the entire leaf wilts, turns blue-green and becomes shriveled and twisted. At this early stage, root and crown tissues appear white and healthy. The leaves soon become reddish brown followed by a discoloration of the roots and crown. Death and decomposition of the entire plant soon follows. Symptoms of bacterial wilt and decline can be confused with anthracnose, red leaf spot, and leaf smuts.

The disease spreads through an infected golf green, killing susceptible plants in just a few days, while apparently immune or highly resistant grass cultivars and species remain unaffected. A diseased golf green characteristically has an uneven mottled appearance with areas of green, resistant grass among the withered and dead diseased turf (Figures 1 and 2).

For further information concerning Turfgrass problems, contact Nancy R. Pataky, Extension Specialist and Director of the Plant Clinic, Department of Crop Sciences, University of Illinois at Urbana-Champaign.

When a recently infected and freshly cut leaf or stem is examined in a drop of water under a light microscope (at about 100X) a white “cloud” of bacteria can be seen oozing from the cut surface within a few seconds (Figure 3).

Disease Cycle

The bacterium overwinters in diseased plants and thatch and is disseminated by rain splash or flowing water, by physical transmission on mowers, hoses, other turfgrass equipment, or shoes, and by planting infected sprigs, sod, or plugs. The bacteria enter healthy grass plants through wounds such as leaf tips cut by mowers. Originally, the bacteria are located in leaf tissue but soon occupy the water-conducting vessels (xylem) in the roots and crown where they quickly multiply. Masses of bacteria in the vessels (Figure 4) prevent the normal movement of water within infected plants causing them to wilt and die.

Control

1. Chemical control. Disease reduction has been achieved on Toronto creeping bentgrass greens using the antibiotic oxytetracycline (sold as Mycoshield, C. Pfizer Corp). Preventative control appears possible when the turf is drenched with antibiotic and at least 50 gallons of water per 1,000 square feet. Applications are needed at 3- to 4-week intervals throughout the spring and fall when the disease is active. Directions on the container label should be carefully followed. Chemical control, however, is presently too expensive and time-consuming to be practical over a long period of time.
2. Cultural control. The use of one or more resistant cultivars (for example, Penncross or Penneagle) should eliminate the need to apply repeated antibiotic drenches to susceptible turf. The disease is usually most severe where the bentgrass is cut at 1/8 to 3/16 of an inch, less severe at 1/4 inch, and uncommon on the collars of greens cut higher than 1/4 inch.
3. In the future, bacterial wilt and decline is likely to infect other bentgrass cultivars as well as other species of turfgrass. The best long-term solution to the problem is to use resistant turfgrasses; however, none are presently being developed for use in the United States.



Figure 2. Close-up of withered and dead Toronto creeping bentgrass surrounded by healthy, disease-resistant grass.

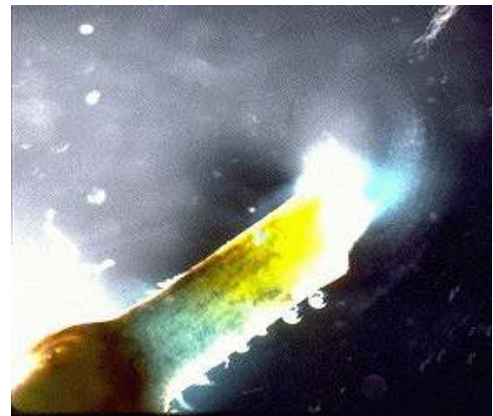


Figure 3. A “cloud” of bacteria emerging from the cut end of a grass stem infected with bacterial wilt.



Figure 4. Scanning electron microscope photo of a xylem vessel in a grass stem filled with *Xanthomonas campestris* pv. *graminis* bacteria (courtesy Dr. D.L. Roberts).

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